

What is claimed is:

1. An active matrix addressing LCD device comprising:

an active matrix substrate having a transparent, dielectric  
5 plate, thin-film transistors (TFTs) arranged on the plate, and pixel  
electrodes arranged on the plate;

gate electrodes of the TFTs having a first multilevel  
conductive structure;

scan lines connected to the corresponding gate electrodes  
10 and having the first multilevel conductive structure;

the first multilevel conductive structure including a TiN  
film located at a top of the structure, an Al-based film located  
below the TiN film, and at least one Ti film located at at least  
one of an upper position and a lower position with respect to the  
15 Al-based film; and

the TiN film of the first multilevel conductive structure  
having a nitrogen concentration of 25 atomic % or higher.

2. The device according to claim 1, further comprising:

20 common electrodes formed on the plate to be opposite to the  
corresponding pixel electrodes; and

common lines formed on the plate to be connected to the  
corresponding common electrodes;

the common electrodes and the common lines having a second

multilevel conductive structure;

the second multilevel conductive structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film, and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film; and

the TiN film of the second multilevel conductive structure having a nitrogen concentration of 25 atomic % or higher.

10 3. The device according to claim 1, wherein each of the scan lines has a terminal at its end for electrical connection to an external circuit;

and wherein the TiN film is exposed from the first multilevel conductive structure at the terminal.

15 4. The device according to claim 2, wherein each of the common lines has a terminal at its end for electrical connection to an external circuit;

and wherein the TiN film is exposed from the second  
20 multilevel conductive structure at the terminal.

5. The device according to claim 1, wherein each of the TFTs comprises a gate insulating film formed to cover the gate electrode, a semiconductor island formed on the gate insulating film, a source

electrode formed on the island, a drain electrode formed on the island to form a channel gap between the drain electrode and the source electrode.

5 6. The device according to claim 1, wherein the first multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Ti film located at the middle, and the Al-based film located at the bottom.

10 7. The device according to claim 1, wherein the first multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Al-based film located at the middle, and the Ti film located at the bottom.

15 8. The device according to claim 1, wherein the first multilevel conductive structure is a four-level structure formed by the TiN film located at the top, the Ti film located at the upper middle, the Al-based film located at the lower middle, and the Ti film located at the bottom.

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9. The device according to claim 2, wherein the first multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Ti film located at the middle, and the Al-based film located at the bottom.

10. The device according to claim 2, wherein the first multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Al-based film located at the middle, and the Ti film located at the bottom.

11. The device according to claim 2, wherein the first multilevel conductive structure is a four-level structure formed by the TiN film located at the top, the Ti film located at the upper middle, the Al-based film located at the lower middle, and the Ti film located at the bottom.

12. An active matrix addressing LCD device comprising:  
an active matrix substrate having a transparent, dielectric plate, thin-film transistors (TFTs) arranged on the plate, and pixel electrodes arranged on the plate;  
source electrodes of the TFTs having a first multilevel conductive structure;  
drain electrodes of the TFTs having the first multilevel conductive structure;  
signal lines connected to the corresponding source electrodes and having the first multilevel conductive structure;  
the first multilevel conductive structure including a TiN film located at a top of the structure, an Al-based film located

below the TiN film, and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film; and

the TiN film of the first multilevel conductive structure  
5 having a nitrogen concentration of 25 atomic % or higher.

13. The device according to claim 12, wherein the pixel electrodes have the first multilevel conductive structure.

10 14. The device according to claim 12, wherein each of the signal lines has a terminal at its end for electrical connection to an external circuit;

and wherein the TiN film is exposed from the first multilevel conductive structure at the terminal.

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15. The device according to claim 12, wherein each of the TFTs comprises a gate insulating film formed to cover the gate electrode, a semiconductor island formed on the gate insulating film, a source electrode formed on the island, a drain electrode formed on the  
20 island to form a channel gap between the drain electrode and the source electrode.

16. The device according to claim 12, wherein the first multilevel conductive structure is a three-level structure formed by the TiN

film located at the top, the Ti film located at the middle, and the Al-based film located at the bottom.

17. The device according to claim 12, wherein the first multilevel  
5 conductive structure is a three-level structure formed by the TiN film located at the top, the Al-based film located at the middle, and the Ti film located at the bottom.

18. The device according to claim 12, wherein the first multilevel  
10 conductive structure is a four-level structure formed by the TiN film located at the top, the Ti film located at the upper middle, the Al-based film located at the lower middle, and the Ti film located at the bottom.

19. The device according to claim 13, wherein the first multilevel  
15 conductive structure is a three-level structure formed by the TiN film located at the top, the Ti film located at the middle, and the Al-based film located at the bottom.

20. The device according to claim 13, wherein the first multilevel  
20 conductive structure is a three-level structure formed by the TiN film located at the top, the Al-based film located at the middle, and the Ti film located at the bottom.

21. The device according to claim 13, wherein the first multilevel conductive structure is a four-level structure formed by the TiN film located at the top, the Ti film located at the upper middle, the Al-based film located at the lower middle, and the Ti film located at the bottom.

22. An active matrix addressing LCD device comprising:

an active matrix substrate having a transparent, dielectric plate, thin-film transistors (TFTs) arranged on the plate, and pixel electrodes arranged on the plate;

gate electrodes of the TFTs having a first multilevel conductive structure;

scan lines connected to the corresponding gate electrodes and having the first multilevel conductive structure;

the first multilevel conductive structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film, and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film;

the TiN film of the first multilevel conductive structure having a nitrogen concentration of 25 atomic % or higher;

source electrodes of the TFTs having a second multilevel conductive structure;

drain electrodes of the TFTs having the second multilevel

conductive structure;

signal lines connected to the corresponding source electrodes and having the second multilevel conductive structure;

the second multilevel conductive structure including a TiN film located at a top of the structure, an Al-based film located  
5 below the TiN film, and at least one Ti film located at an upper position or both an upper position and a lower position with respect to the Al-based film; and

the TiN film of the second multilevel conductive structure  
10 having a nitrogen concentration of 25 atomic % or higher.

23. The device according to claim 22, further comprising:

common electrodes formed on the plate to be opposite to the  
corresponding pixel electrodes; and

15 common lines formed on the plate to be connected to the corresponding common electrodes;

wherein the common electrodes and the common lines have the first multilevel conductive structure.

20 24. The device according to claim 22, wherein the pixel electrodes have the first multilevel conductive structure.

25. The device according to claim 23, wherein the pixel electrodes have the first multilevel conductive structure.



26. The device according to claim 22, wherein each of the scan lines has a terminal at its end for electrical connection to an external circuit;

5 and wherein the TiN film is exposed from the first multilevel conductive structure at the terminal.

27. The device according to claim 23, wherein each of the common lines has a terminal at its end for electrical connection to an external circuit;

10 and wherein the TiN film is exposed from the second multilevel conductive structure at the terminal.

28. The device according to claim 22, wherein each of the TFTs comprises a gate insulating film formed to cover the gate electrode, a semiconductor island formed on the gate insulating film, a source electrode formed on the island, a drain electrode formed on the island to form a channel gap between the drain electrode and the source electrode.

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29. The device according to claim 22, wherein the first multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Ti film located at the middle, and the Al-based film located at the bottom.

30. The device according to claim 22, wherein the first multilevel  
conductive structure is a three-level structure formed by the TiN  
film located at the top, the Al-based film located at the middle,  
5 and the Ti film located at the bottom.

31. The device according to claim 22, wherein the first multilevel  
conductive structure is a four-level structure formed by the TiN  
film located at the top, the Ti film located at the upper middle,  
10 the Al-based film located at the lower middle, and the Ti film  
located at the bottom.

32. The device according to claim 23, wherein the first multilevel  
conductive structure is a three-level structure formed by the TiN  
15 film located at the top, the Ti film located at the middle, and  
the Al-based film located at the bottom.

33. The device according to claim 23, wherein the first multilevel  
conductive structure is a three-level structure formed by the TiN  
20 film located at the top, the Al-based film located at the middle,  
and the Ti film located at the bottom.

34. The device according to claim 23, wherein the first multilevel  
conductive structure is a four-level structure formed by the TiN

film located at the top, the Ti film located at the upper middle, the Al-based film located at the lower middle, and the Ti film located at the bottom.

5 35. An active matrix addressing LCD device comprising:

an active matrix substrate having a transparent, dielectric plate, thin-film transistors (TFTs) arranged on the plate, and pixel electrodes arranged on the plate;

gate electrodes of the TFTs having a first multilevel  
10 conductive structure;

scan lines connected to the corresponding gate electrodes and having the first multilevel conductive structure;

the first multilevel conductive structure including a TiN film located at a top of the structure, an Al-based film located  
15 below the TiN film, and at least one Ti film located at at least one of an upper position and a lower position with respect to the Al-based film;

the TiN film of the first multilevel conductive structure having a nitrogen concentration of 25 atomic % or higher;

20 source electrodes of the TFTs having a second multilevel conductive structure;

drain electrodes of the TFTs having the second multilevel conductive structure;

signal lines connected to the corresponding source

electrodes and having the second multilevel conductive structure;

the second multilevel conductive structure including a TiN film located at a top of the structure, an Al-based film located below the TiN film, and at least one Ti film located at an upper position or both an upper position and a lower position with respect to the Al-based film; and

the TiN film of the second multilevel conductive structure having a nitrogen concentration of 25 atomic % or higher.

10 36. The device according to claim 35, further comprising:

common electrodes formed on the plate to be opposite to the corresponding pixel electrodes; and

common lines formed on the plate to be connected to the corresponding common electrodes;

15 wherein the common electrodes and the common lines have the first multilevel conductive structure.

37. The device according to claim 35, wherein the pixel electrodes have the second multilevel conductive structure.

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38. The device according to claim 35, wherein each of the scan lines has a terminal at its end for electrical connection to an external circuit;

and wherein the TiN film is exposed from the first

multilevel conductive structure at the terminal.

39. The device according to claim 35, wherein each of the signal lines has a terminal at its end for electrical connection to an external circuit;

and wherein the TiN film is exposed from the second multilevel conductive structure at the terminal.

40. The device according to claim 36, wherein each of the common lines has a terminal at its end for electrical connection to an external circuit;

and wherein the TiN film is exposed from the first multilevel conductive structure at the terminal.

41. The device according to claim 35, wherein each of the TFTs comprises a gate insulating film formed to cover the gate electrode, a semiconductor island formed on the gate insulating film, a source electrode formed on the island, a drain electrode formed on the island to form a channel gap between the drain electrode and the source electrode.

42. The device according to claim 35, wherein the first multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Ti film located at the middle, and

the Al-based film located at the bottom.

43. The device according to claim 35, wherein the first multilevel  
conductive structure is a three-level structure formed by the TiN  
5 film located at the top, the Al-based film located at the middle,  
and the Ti film located at the bottom.

44. The device according to claim 35, wherein the first multilevel  
conductive structure is a four-level structure formed by the TiN  
10 film located at the top, the Ti film located at the upper middle,  
the Al-based film located at the lower middle, and the Ti film  
located at the bottom.

45. The device according to claim 35, wherein the first multilevel  
15 conductive structure is a three-level structure formed by the TiN  
film located at the top, the Ti film located at the middle, and  
the Al-based film located at the bottom.

46. The device according to claim 35, wherein the first multilevel  
20 conductive structure is a three-level structure formed by the TiN  
film located at the top, the Al-based film located at the middle,  
and the Ti film located at the bottom.

47. The device according to claim 35, wherein the first multilevel

conductive structure is a four-level structure formed by the TiN film located at the top, the Ti film located at the upper middle, the Al-based film located at the lower middle, and the Ti film located at the bottom.

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48. The device according to claim 35, wherein the second multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Ti film located at the middle, and the Al-based film located at the bottom.

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49. The device according to claim 35, wherein the second multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Al-based film located at the middle, and the Ti film located at the bottom.

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50. The device according to claim 35, wherein the second multilevel conductive structure is a four-level structure formed by the TiN film located at the top, the Ti film located at the upper middle, the Al-based film located at the lower middle, and the Ti film located at the bottom.

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51. The device according to claim 35, wherein the second multilevel conductive structure is a three-level structure formed by the TiN film located at the top, the Ti film located at the middle, and

the Al-based film located at the bottom.

52. The device according to claim 35, wherein the second multilevel  
conductive structure is a three-level structure formed by the TiN  
5 film located at the top, the Al-based film located at the middle,  
and the Ti film located at the bottom.

53. The device according to claim 35, wherein the second multilevel  
conductive structure is a four-level structure formed by the TiN  
10 film located at the top, the Ti film located at the upper middle,  
the Al-based film located at the lower middle, and the Ti film  
located at the bottom.